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PROBLEMS FOR SOLUTION.

ARITHMETIC.

77. Proposed by F. S. ELDER, Professor of Mathematics, Oklahoma University, Norman, Oklahoma.

For how many seconds must I count the clicking of the rails under a train that the number of rails counted may be equal to the speed of the train in miles per hour, a rail being 30 feet long?

78. Proposed by NELSON S. RORAY, South Jersey Institute, Bridgeton, New Jersey.

Solve by pure arithmetic, no algebraic symbols: A Texan farmer owns 5169 cattle; there are 3 times as many horses as cows, plus 569, and 4 times as many cows as sheep, minus 126; how many has he of each? [From *Brooks' Higher Arithmetic*.]

79. Proposed by F. M. PRIEST, St. Louis, Missouri.

How many \$20 gold pieces can be put in a room 20 feet long, 18 feet wide, and 9 feet high?

GEOMETRY.

77. Proposed by CHARLES C. CROSS, Laytonsville, Maryland.

A line is drawn perpendicular to BC , of the triangle ABC , whose sides are $BC=a$, $CA=b$, and $AB=c$, through A to D , a distance d , (d being equal to or greater than $a+b$); from D a line is drawn to E , a distance e , (e being equal to or greater than $a+b+c$) on BC extended. Required the area of the ellipse which is isogonal conjugate to the straight line DE with respect to the triangle ABC .

78. Proposed by J. A. MOORE, Professor of Mathematics, Millsaps College, Jackson, Mississippi.

Required the number of normals that can be drawn from any point (a, b) to the parabola $y^2 = 2px$.

77. Proposed by JOHN MACNIE, Professor of Mathematics, University of North Dakota, University, North Dakota.

To construct a quadrilateral of given area, the diagonals, one of which is given, cutting each other in given ratios and at a given angle.

MECHANICS.

55. Proposed by ALFRED HUME, C. E., D. Sc., Professor of Mathematics, University of Mississippi, University P. O., Mississippi.

Three equal heavy spheres, each of weight W , are placed on a rough ground just not touching each other. A fourth sphere of weight nW is placed on the top touching all three. Show that there is equilibrium if the coefficient of friction between two spheres is greater than $\tan \frac{1}{2} \alpha$, and that between a sphere and the ground is greater than $\tan \frac{1}{2} \alpha n / (n+3)$, where α is the inclination to the vertical of the straight line joining the centers of the upper and one lower sphere.

56. Proposed by H. C. WHITAKER, A. M., Ph. D., Professor of Mathematics, Manual Training School, Philadelphia, Pennsylvania.

"Hey-diddle-diddle, the cat and the fiddle,
The cow jumped over the moon."

Taking the weight of the cow to be 600 pounds, the initial resistance of the air to be 100 pounds and varying as the square of the velocity, find the initial and final velocities and the times of rising and falling.